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ABSTRACT

As part of its survey of the demand for engineers and technicians conducted in the early part of 1970, the Engineering Manpower Commission asked employers two questions. The first request was: "Please list any curriculum areas in engineering where the number of graduates seems to be badly out of balance with employment needs at current compensation rates, and indicate whether these areas should be expanded or curtailed." The second request was similar except it asked for technician curriculum areas. Nearly 150 employers in manufacturing, production, consulting, and education replied and practically all of them cited areas that, in their view, needed to be expanded. Among the most often cited areas were civil, chemical, and electrical-power. The two areas which were most often cited for curtailment were aerospace and electronic. Several employers added comments to their responses. (Author/TS)

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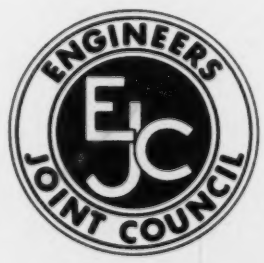
SUPPLY-DEMAND IMBALANCES

AS SEEN BY

EMPLOYERS OF ENGINEERS AND TECHNICIANS

A REPORT BY THE

ENGINEERING MANPOWER COMMISSION
OF
ENGINEERS JOINT COUNCIL
345 EAST 47TH STREET
NEW YORK, NEW YORK 10017



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SUPPLY-DEMAND IMBALANCES AS SEEN BY EMPLOYERS OF ENGINEERS AND TECHNICIANS

As part of its survey of the demand for engineers and technicians conducted in the early part of 1970, the Engineering Manpower Commission asked employers to indicate any areas in which they saw an imbalance between the number of graduates from various programs and their own needs for employees. Nearly 150 employers took the trouble to write in replies to this question, and practically all of them cited areas that, in their view, needed to be expanded.

It should be noted that the employment market for engineers and technicians in early 1970 was still fairly active. Nevertheless employers in this same survey were projecting a substantial cutback in their hiring plans for 1970 and 1971, which have since been reflected in the current depressed demand for engineers as compared with recent past years. Thus the employers who set forth their ideas on the need for increased emphasis in certain curriculum areas were not, in general, influenced by unrealistically optimistic visions of expanding employment. Their views should, therefore, be of interest to educators despite today's relatively inactive employment market. In particular they seem to indicate directions in which educational effort might be shifted away from fields, such as aerospace, where employment demand is known to be weak, toward others in which jobs are more likely to be available even in times of industrial retrenchment.

In view of the overall engineering and technological employment situation existing in mid-1971, schools should not interpret the term "expansion" as used in this report as implying an unlimited expansion of any of the curriculum areas mentioned. Within a broad engineering or technology program, however, some of these areas might warrant selective expansion to offset decreasing demand for graduates in other specialties, particularly where the results of the EMC survey are supported by the school's own placement experience.

Comments relating to engineering curricula start on page 2, while those relating to technician programs start on page 13.

I. QUESTION: Please list any curriculum areas in engineering where the number of graduates seems to be badly out of balance with employment needs at current compensation rates, and indicate whether these areas should be expanded or curtailed.

Kind of Company	Curriculum Area	Imbalance Requiring	Comments
Specialty chemical manufacturer	Sales Engineering	Expansion	
Major pharmaceuticals manufacturer	Chemical Engineering Mechanical Engineering	Expansion Expansion	
Small pharmaceuticals manufacturer	Chemical Engineering	Expansion	Insufficient supply
Small pharmaceuticals manufacturer	Chemical Engineering	Expansion	
Industrial chemical producer	Chemical	Expansion	
Major chemical manufacturer	Chemical Engineering Mechanical Engineering	Expansion Expansion	
Oil company	Petroleum Engineering	Expansion	
Oil company	Chemical Engineering Petroleum Engineering Electrical Engineering Mechanical Engineering	Expansion Expansion Expansion Expansion	
Major oil company	Chemical Engineering Petroleum Engineering	Expansion Expansion	Continue emphasis on attracting students to these fields
Electrical equipment manufacturer	Electronic Power	Curtailment Expansion	Many companies retrain Not enough available
Electronic equipment manufacturer	Integrated circuits	Expansion	Need more classroom theory
Electronic instrument manufacturer	Graduate Electrical	Expansion	Require higher educational level
Electronic instrument manufacturer	Computer Science Electronics	Expansion Expansion	

QUESTION I [Continued]

Kind of Company	Curriculum Area	Imbalance Requiring	Comments
Electrical and electronic equipment manufacturer	Electrical Engineering	Expansion	
Industrial controls manufacturer	Mechanical & related Electronics & related	Expansion Curtailment	A bit top heavy in electronics
Computer manufacturer	Electrical Engineering Industrial Engineering	Expansion Curtailment	
Aluminum producer	Chemical Engineering Mechanical Engineering	Expansion Expansion	
Non-ferrous metals producer	Mining Mineral Beneficiation - Extractive Metallurgy	Expansion Expansion	
Specialty metals company	Metallurgy	Expansion	
Steel company	Metallurgical Engineering	Expansion	
Specialty steel producer	Metallurgical Engineering	Expansion	
Steel producer	Electrical Engineering Mechanical Engineering Metallurgical & Chem.	Expansion Expansion Curtailment	As per recruiting results
Metal products manufacturer	Consumer Product Development and Design	Expansion	Could be non-college "degree"
Auto parts manufacturer	Research Development Design	Curtailment Expansion Expansion	
Machinery manufacturer	Mechanical-Agricultural	Expansion	Shortage of this specific type
Foundry	Mechanical Engineering	Expansion	
Metal products manufacturer	Need better training in engineering materials and in actual design	Expansion	

QUESTION I [Continued]

Kind of Company	Curriculum Area	Imbalance Requiring	Comments
Machinery manufacturer	Civil Engineering	Expansion	
Large can company	Mechanical Engineering	Expansion	
Metal products manufacturer	Welding Engineering	Expansion	
Lubricating products manufacturer	Plastics Engineering	Expansion	
Metal products manufacturer	Product Design	Expansion	
Refractories manufacturer	Ceramic Engineering	Expansion	
Household products manufacturer	Industrial Engineering Ceramics Engineering	Expansion Expansion	
Cement company	Chemical Engineering	Expansion	
Sulfur producer	Electrical Engineering Chemical Engineering	Curtailment Expansion	
Iron mining company	Mining Engineers	Expansion	
Copper producer	Mining Engineering Metallurgy Materials Engineering	Expansion Expansion Expansion	Acute shortage Acute shortage
Non-ferrous mining company	Mining Engineers	Expansion	Definite shortage
Uranium mining company	Mine Engineers	Expansion	Present shortage is worsening each year due to lack of graduates
Paper company	Cost Engineering & Estimating	Expansion	
Paper company	Mechanical Engineering	Expansion	
Paper machinery manufacturer	Refrigeration	Expansion	

QUESTION I [Continued]

Kind of Company	Curriculum Area	Imbalance Requiring	Comments
Machinery manufacturer	Mechanical Design	Expansion	
Materials handling equipment manufacturer	Fluidics	Expansion	More courses in hydraulic drives and controls
Machinery manufacturer	Aerospace	Curtailment	Seems that most engineers are in Aerospace. I cannot use them
Pump manufacturer	Aerospace	Curtailment	Gov't action
Conveyor manufacturer	Elect., Electronics, & related	Expansion	Need here is for experienced industrial control people
Electrical equipment manufacturer	Electrical	Expansion	
Household equipment manufacturer	Electrical Industrial	Expansion Curtailment	
Auto parts manufacturer	Electronic Design	Expansion	
Automobile manufacturer	Mechanical	Expansion	
Fabricated products	Plastics Engineers	Expansion	
Metal parts fabricator	Industrial Engineering	Expansion	Job shop background rather than high production
Machinery manufacturer	Agricultural Engineering	Curtailment	Depressed farm economy
Photographic manufacturer	Electrical Engineering		Probably oversupply is only temporary
	Chemical Engineering	Expansion	Chronic shortage
Electrical controls manufacturer	Mechanical Electrical	Expansion Expansion	
Office machines manufacturer	M.S.-All Engineers	Curtailment	Overpriced

QUESTION I [Continued]

Kind of Company	Curriculum Area	Imbalance Requiring	Comments
Machinery manufacturer	Reliability Engineering Turbine background	Expansion Expansion	
Structural design consulting firm	Civil & Architectural	Expansion	Shortage would be serious, were it not for other firms recruiting abroad and bringing foreign engineers to the area
Heavy construction company	Chemical Engineers Electrical Engineers		We have experienced a critical shortage of chemical and electrical engineers, but not related to compensation rates
Construction firm	Civil & Construction	Expansion	
Design and construction company	Civil (M.S. & Ph.D.)	Curtailment	
Construction firm	Heavy Construction	Expansion	Civil engineering schools seem to be abdicating construction
Structural design consulting firm	M.S. Level - Structural Dymanics		Need U.S. citizens; graduates
Consulting engineering firm	Engineering Practice	Expansion	Present goals of engrg. education misdirected
Structural design consulting firm	Civil Engineering	Expansion	
Structural design consulting firm	Civil and related	Expansion	
Structural design consulting firm	Mechanical, Electrical, Heating - Buildings	Expansion	
Structural design consulting firm	Civil Mechanical	Expansion Curtailment	Highways & Sanitation Reduction war contracts

QUESTION I [Continued]

Kind of Company	Curriculum Area	Imbalance Requiring	Comments
Structural design consulting firm	Civil Design	Expansion	Ports and bridges
Structural design consulting firm	B.S. Civil Engineering	Expansion	
	M.S. Sanitary Engrg.	Expansion	
Structural design consulting firm	Civil Design	Expansion	
Structural design consulting firm	Industrial Waste Treatment	Expansion	
	Electrical Engineering	Expansion	Very few applicants with experience
Industrial & structural design firm	Mechanical - Power & HVAC	Expansion	
	Electrical - Power	Expansion	
	Civil - General	Expansion	
	Chemical - Water & Waste Treatment	Expansion	
Structural design consulting firm	Engineering Economics (including valuation of utility properties)	Expansion	Can't find any candidates
Structural design consulting firm	Civil	Curtailment	
	Mechanical	Expansion	Can't hire experienced men in these 2 branches
	Electrical	Expansion	
Structural design consulting firm	Electrical	Expansion	This is most critical area
	Mechanical	Expansion	
	Industrial	Expansion	
Structural design consulting firm	Mech. & Elec. Bldg. Design	Expansion	
Structural design consulting firm	Business	Expansion	
	Law	Expansion	
Engineering consulting firm	Mining Engineering	Expansion	
Engineering consulting firm	Mechanical Engineers	Expansion	Short in the facility field
	Electrical Enginers	Expansion	
	Electronic Engineers	Curtailment	Too many gadgeteers

QUESTION I [Continued]

Kind of Company	Curriculum Area	Imbalance Requiring	Comments
Petroleum service company	Electrical & related		Slowing of the general economy, industry slowdown due to political & social related factors affecting offshore & Alaska operations
Engineering service company			Engineering graduates that we interview & hire generally have excellent academic qualifications, and theoretical knowledge, but lack practical application experience. We would like to see more co-op programs for engineering students
Public power producer	Power Option - EE	Expansion	More faculty interest needed
Electric utility	Power Option - Mechanical	Expansion	
Electric utility	Electric Power - Systems	Expansion	
Electric utility	Electrical Civil	Expansion Curtailment	
Electric utility	Electric Power	Expansion	
Electric utility	Electrical (Power)	Expansion	Field has been ignored
Electric utility	Electrical Engrs. - Power Work		Expansion
Electric utility	Power Engineering	Expansion	Glamour of electronics & space age outdraw utility engineer
Electric utility	Electrical - Power Option	Expansion	

QUESTION I [Continued]

Kind of Company	Curriculum Area	Imbalance Requiring	Comments
Electric utility	Electrical - Power Option	Expansion	
Gas & electric utility	Power Engineering	Expansion	Very few schools offer power option
Electric utility	Power Generation and Distribution	Expansion	Very little orientation toward power industry
Electric utility	Power Systems, EE	Expansion	
Electric utility	Electrical Engineering - Power Oriented	Expansion	
Electric utility	Electrical - Power Engr.	Expansion	
Gas & electric utility	Electrical (Utility) Gas (Utility)	Expansion Expansion	
Gas utility	Chemical Engineering	Expansion	
Gas pipeline company	Chemical Petroleum Metallurgical	Expansion Expansion Expansion	
Gas producer	Sales Engineering	Expansion	
Telephone company	Electrical	Expansion	
Telephone company	Electrical Engineering	Expansion	Inadequate manpower available for operation engineering applications
Railroad	Civil Engineering	Expansion	More needed
Trucking company	Experienced Civil Engineers	Expansion	
Research firm	Materials	Expansion	
Communications R&D laboratory	Computer Science Operations Research	Expansion Expansion	
Engineering school	Computer engineering Aerospace Environmental Engineering	Expansion Curtailment Expansion	

QUESTION I [Continued]

Kind of Company	Curriculum Area	Imbalance Requiring	Comments
Engineering school	Industrial Engineering	Expansion	
Engineering school	Welding Engineering	Expansion	Is not attractive to new students but demands are tremendous
Engineering school	Aerospace	Curtailment	
	Oceanography	Expansion	
	Environmental Engineering	Expansion	
Engineering school	Industrial Engineering	Expansion	
Engineering school	Computer science	Expansion	Ph.D's in short supply
Engineering school	Mechanical engineering		Supply most plentiful-may not be surplus, however
Engineering school	Ceramic Engineering	Expansion	
Engineering school	Manufacturing	Expansion	
Armed forces academy	Engineering Materials	Expansion	
	Ocean Engineering	Expansion	
	Computer Science	Expansion	
Engineering school	Transportation Specialist	Expansion	
Engineering school	Mechanical Design, Ph.D.	Expansion	
Engineering school	Management Engineering	Expansion	
Engineering school	Social Systems	Expansion	
	Transportation	Expansion	
	Applied Mechanics	Curtailment	Too many Ph.D.'s
Engineering school	Chemical & Natural Gas	Expansion	
	Electrical & Electronics	Expansion	
Engineering school	Civil Engineering	Expansion	
	Chemical Engineering	Expansion	
	Electrical Engineering	Expansion	
Engineering school	Agricultural Engineering	Expansion	
Engineering school	Naval Architecture	Expansion	

QUESTION I [Continued]

Kind of Company	Curriculum Area	Imbalance Requiring	Comments
Federal agency	Electrical	Expansion	
	Environmental	Expansion	
	Mechanical	Expansion	
State highway department	Civil Engineering	Expansion	
State transportation department	Environmental Engineering: (Urban & Regional Systems Design)	Expansion	
	Civil Engineering	Expansion	
State public works department	Civil Engineering	Expansion	Starting pay is too low
State highway department	Civil Engineering	Expansion	
State highway department	Civil Engineering	Expansion	
City water department	Civil and Related	Expansion	
City transportation department	Traffic Engineers	Expansion	Need more
County park department	Civil and related	Expansion	Salary schedules need improvement
City public works department	Civil	Expansion	
City public service department	EE	Expansion	Large demand for EE graduates

II. QUESTION: Please list any technician curriculum areas where the number of graduates seems to be badly out of balance with employment needs, and indicate whether these areas should be expanded or curtailed.

Kind of Company	Curriculum Area	Imbalance Requiring	Comments
Specialty chemical manufacturer	Drafting	Expansion	
	Chemical Laboratory Tech.	Expansion	
Specialty chemical manufacturer	Chemical	Expansion	
Oil Company	Chemical Engineering	Expansion	Industry could use more in each category
	Mechanical Engineering	Expansion	
	Electrical (Power) Engrg.	Expansion	
Electronic equipment manufacturer	Solid-State Theory	Expansion	Need less tube theory for our products
Electronic equipment manufacturer	Electronic Test Techniques	Expansion	
Radio manufacturer	E.T. & M.T. at A.S. & B.S. Level	Expansion	
Computer manufacturer	Electro/Mechanical	Expansion	
	Chem/Electronics	Expansion	
Steel company	Electronic Repair and Maintenance	Expansion	
Specialty steel producer	Metallurgical	Expansion	
Steel company	Electrical	Expansion	
	Mechanical	Expansion	
Metal products manufacturer	Drafting/Design	Expansion	
Auto parts manufacturer	Chemical	Expansion	
	Drafting	Expansion	
Machinery manufacturer	Mechanical Technicians	Expansion	
Foundry	Mechanical Technicians	Expansion	
Metal products manufacturer	Drafting & Design	Expansion	

QUESTION II [Continued]

Kind of Company	Curriculum Area	Imbalance Requiring	Comments
Household products manufacturer	Quality Control Technicians	Expansion	
	Ceramic Technicians	Expansion	
Non-ferrous mining company	Electrical	Expansion	Shortage of mine electricians
Talc producer	Chemistry-Surveying	Expansion	
	Technical assistants - Technicians	Expansion	Not everyone can be president
Paper box company	Design Engineers for Corrugated Industry	Expansion	
Paper company	Electrical Distribution and Control Draftsmen and Installation Supervisors	Expansion	
Machinery manufacturer	Mechanical Drafting	Expansion	
	Structural Drafting	Expansion	
Machinery manufacturer	Design & Related Activities	Expansion	
Conveyor manufacturer	Design & Related Activities	Expansion	Conveyor design and application is not taught in schools--for that matter, Materials Handling in general is not being specialized in as far as we know
Household equipment manufacturer	Electrical	Expansion	
	Industrial	Curtailment	
Auto parts manufacturer	Manufacturing Methods	Expansion	
Fabricated products manufacturer	Electronic Technicians	Expansion	
Machinery manufacturer	Mechanical Design Technology	Expansion	Lacking in our area
Photographic equipment manufacturer	Chemical Technology	Expansion	

QUESTION II [Continued]

Kind of Company	Curriculum Area	Imbalance Requiring	Comments
Electrical controls manufacturer	Electronic Technician	Expansion	
	Mechanical Designers	Expansion	
Office products manufacturer	Mechanical Technicians	Expansion	
Aircraft engine manufacturer	Computer Science	Expansion	
Machinery manufacturer	Mechanical Technology	Expansion	Need more who are interested in manuturing (tool engineering and processing)
Machinery manufacturer	Data Processing	Curtailment	
Heavy construction company	Electrical	Expansion	
	Chemical	Expansion	
Design and construction company	Structural Design	Expansion	Critical need
	Electrical Power	Expansion	Critical need
Consulting engineering firm	Math.-Physics-English	Expansion	Too much stress on skills in curriculum
Structural design consulting firm	Structural & Highway Drafting	Expansion	Extreme shortage exists in qualified personnel
	Surveying	Expansion	
	Construction Inspection	Expansion	
Structural design consulting firm	Design & Related Activities	Expansion	
Structural design consulting firm	Civil	Expansion	Highways & sanitation
	Mechanical	Curtailment	Reduction war contracts
Structural design consulting firm	Civil Design	Expansion	
Structural design consulting firm	Land Surveyors	Expansion	
Structural design consulting firm	Drafting, Design and related	Expansion	
	Civil Engrg. and related	Expansion	

QUESTION II [Continued]

Kind of Company	Curriculum Area	Imbalance Requiring	Comments
Structural design consulting firm	Civil Technology & Drafting	Expansion	
Structural design consulting firm	Civil Engineering & related	Expansion	Appears to be more of an awareness on the part of the schools of this need
Structural design consulting firm	Sanitary Engineering	Expansion	Need for additional employees in water and air pollution fields
Structural design consulting firm	Mechanical Civil Electrical (non-electronic)	Expansion Expansion Expansion	
Structural design consulting firm	Air Conditioning Piping Electrical	Expansion Expansion Expansion	Fully qualified design draftsmen not available
Structural design consulting firm	Civil Tech.-Environmental Civil Tech.-Computer Usage	Expansion Expansion	
Structural design consulting firm	Electrical Mechanical Industrial	Expansion Expansion Expansion	Most critical
Structural design consulting firm	Electrical (power & lighting) Mechanical (air conditioning)	Expansion Expansion	
Structural design consulting firm	Mech. & Elec. Bldg. Design	Expansion	
Structural design consulting firm	Research & Development	Expansion	
Construction firm			We need skilled craftsmen--a few engineers go a long way in construction
Structural design consulting firm	Mech.-Facility Designers Elec.-Facility Designers Drafting-Facility	Expansion Expansion Expansion	Supply short and quality poor

QUESTION II [Continued]

Kind of Company	Curriculum Area	Imbalance Requiring	Comments
Electric utility	Electrical Technology	Expansion	
Electric utility	Electronics	Curtailment	
Electric utility	2 year Electrical Tech.	Expansion	Too many 2 year people are trying to develop into a 4 year technologist leaving a void
Gas & electric utility	Gas (Utility) Electric (Utility)	Expansion Expansion	
Gas utility	Mechanical Computer, Mathematical Electrical	Expansion Expansion Curtailment	
Railroad	Civil Engineering - Surveyor	Expansion	
Research firm	Materials	Expansion	
Aerospace manufacturer	Chemical Technician Physical Science Tech.	Expansion Expansion	
Engineering school	Nuclear Technicians	Expansion	
Engineering school	Electronics Numerical control	Expansion Expansion	
Armed forces academy	General specialization in TV projection (closed circuit)	Expansion	
Engineering school	Chemical Electrical Mechanical	Expansion Expansion Expansion	
Engineering school	Electrical, Electronics, etc.	Expansion	
Engineering school	Electronics Mechanical	Expansion Expansion	
Engineering school	EE	Expansion	
Engineering school	Agricultural Engineering	Expansion	

QUESTION II [Continued]

Kind of Company	Curriculum Area	Imbalance Requiring	Comments
Engineering school	Electrical Engineering	Expansion	
	Textile Engineering	Expansion	
	Civil Engineering	Expansion	
	Chemistry and Chem. Engrg.	Expansion	
Engineering school	4-year Terminal Technologies	Expansion	
Engineering school	Electronic Technician	Expansion	
Community college	Mechanical Technology	Curtailment	
	Gas Welding	Curtailment	
	Electronic Welding	Expansion	
State highway department	Highway Technology	Expansion	
State highway department	Civil Technology	Expansion	
State transportation department	Civil Technology	Expansion	
State highway department	Drafting	Expansion	Pay scale too low to attract individuals
City water department	Civil and related	Expansion	
County park department	Civil Technology	Expansion	Insufficient educational programs
City water department	Sanitary Engineering	Expansion	
City water department	Instrumentation-Automation	Expansion	Involving maintenance and repairs including remote supervisory electrical-electronic equipment

ENGINEERS JOINT COUNCIL

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